The goal of the second project is study some papers relevant to the course, in preparation of the final project. Working in pairs is allowed. Below are suggested papers, arranged in six subject areas. All papers are available online, either via the UIC electronic library system and/or via the authors web pages.

computer aided geometric design

For this topic we consider a trilogy:

- Guoliang Xu, Chandrajit L. Bajaj, and Weimin Xue: **Regular algebraic curve segments (I) – Definitions and characteristics.** *Computer Aided Geometric Design* 17:485-501, 2000.
- Guoliang Xu, Chandrajit L. Bajaj, and Chuan I Chu: **Regular algebraic curve segments (II) – Interpolation and approximation.** *Computer Aided Geometric Design* 17:503-519, 2000.
- Chandrajit L. Bajaj and Guoliang Xu: **Regular algebraic curve segments (III) – applications in interactive design and data fitting.** *Computer Aided Geometric Design* 18:149-173, 2001.

the computation of Nash equilibria

- Ruchira S. Datta: **Finding all Nash equilibria of a finite game using polynomial algebra.** To appear in *Journal of Economic Theory.*

automatic differentiation

- Andreas Griewank: **A mathematical view of automatic differentiation.** *Acta Numerica* 12: 1-78, Cambridge University Press, 2003.

resolution of singularities

- Herwig Hauser: **Desingularization of ideals and varieties.** In *Proceedings of Winter School on Resolution of Singularities*, Marseille 2005, edited by Anne Pichon.

algebraic statistics

- Lior Pachter and Bernd Sturmfels: **The Mathematics and Phylogenomics.** *SIAM Review* 49(1):3-31, 2007.

tropical geometry

- Thorsten Theobald: **On the frontiers of polynomial computations in tropical geometry.** *Journal of Symbolic Computation* 41:1360-1375, 2006.

The deadline is Wednesday 4 April 2007 at 9AM

The deliverable of this project is a technical report of at least five and not more than ten pages long. There are three items the report must contain.

In this report you must define the problem and describe *in your own words* the results of the paper you have chosen. When copying from a paper – e.g., the statement of a theorem – you must explicitly cite the paper.

Secondly, the report should describe a computational experiment illustrating the most important aspects discussed in the paper. An appendix to the report can be the output of a Maple worksheet, or the listing of a program on some examples.

The third and last element of the report is the conclusion. This should read like an executive summary. It should be brief, but completely self-contained. Summarize in one or two paragraphs what is most important about your project.

Feel free to come to my office for help.